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ABSTRACT

This document discusses five principles thought essential to breaking with the past and establishing a new standard for school facilities design. These principles demand that schools be exemplary examples to students in pursuing new frontiers; that they direct students by encouraging proper behaviors; and that they evoke a spirit of place, represent three-dimensional opportunities to support teaching, and affect positive change in education. Final comments briefly highlight why school districts often fail to design schools that fall short of these principles. (GR)

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Expecting the Most from School Design

- **full text:** Expecting the Most From School Design
- **about the author:** William S. Bradley
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Thomas Jefferson Center for Educational Design

Curry School of Education
University of Virginia
405 Emmet Street
Charlottesville, Virginia 22903

VMDO Architects

Phone: 804-296-5684
Fax: 804-296-4496

bradley@vmdo.com

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Occupation

- **Educational Programmer**
  VMDO Architects
  Charlottesville, VA
- **Assistant Professor**
  Curry School of Education
  University of Virginia
- **Assistant Director**
  Thomas Jefferson Center for Educational Design
  University of Virginia

Education

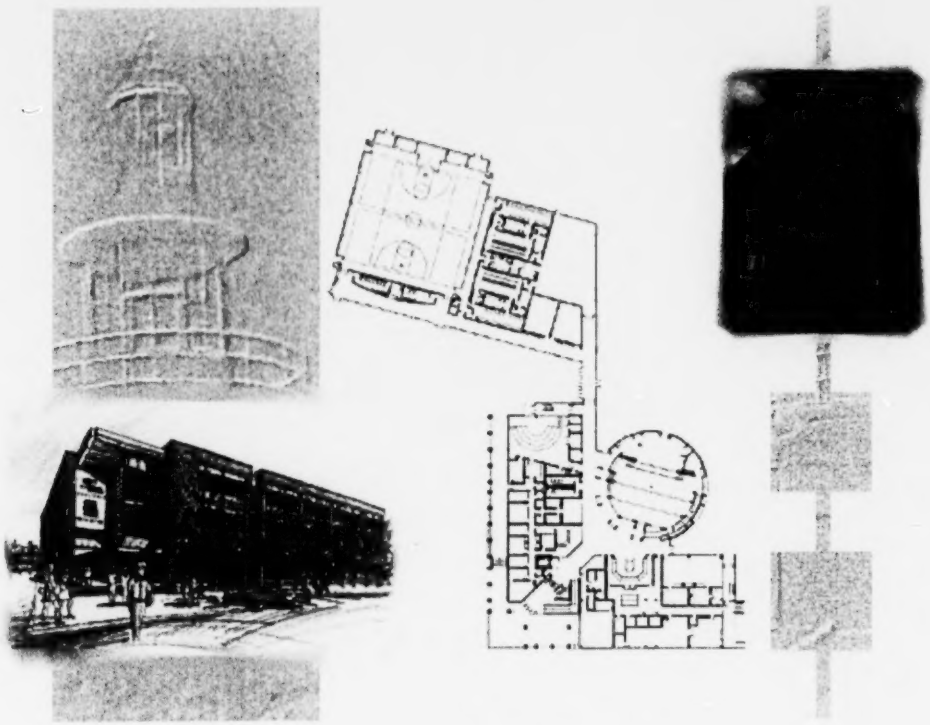
- **Doctor of Philosophy**
  Education
  University of Virginia
- **Master of Education**
  Research
  University of Virginia
- **Bachelor of Science**
  Architecture
  Clemson University

Affiliations

- **American Institute of Architects**
  associate
- **Council of Educational Facilities Planners, International**
  member
- **Phi Delta Kappa**
  officer

Links

- Paper: Expecting the Most From School Design
- Paper: Reconsidering the Process By Which Schools Are Designed
- Paper: The Evolving Role of the Armerican Schoolhouse
- Paper: Lessons From Curitiba
- Course syllabus: School Design



Manassas Park High School, Manassas Park, VA, designed by VMDO Architects PC, Charlottesville, VA.

Expecting the Most From School Design

William S. Bradley, Ph.D.

Thomas Jefferson Center for Educational Design
University of Virginia
405 Emmet Street
Charlottesville, Virginia 22903

Phone: 804-982-2873
Fax: 804-924-0747

wbradley@virginia.edu

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Expecting the Most from School Design

What follows is the transcript of a paper presented by William Bradley on July 10, 1997 to educators and architects at the first annual conference on educational design hosted by the Thomas Jefferson Center for Educational Design on Grounds at the University of Virginia.

Introduction

In the last twenty years our expectations for public education have increased markedly. Since *A Nation At Risk* put this country's schools under the microscope in 1983, waves of school reform have passed intent on raising the standard for students, teachers, and administrators. Indeed, students are mastering and teachers are teaching concepts that were unheard of twenty years ago. By way of example, fifth graders in the Commonwealth are expected to "describe advantages and disadvantages of various computer processing, storage, retrieval, and transmission techniques" and eighth graders are expected to use spreadsheets, databases, advanced publishing software, and graphics programs to compose and edit "hypermedia documents... that can be accessed by worldwide networks." And teachers, to stay abreast of new curricula, instructional theory, and educational technology, are expected to fulfill more requirements than ever in the arts and sciences. Their teacher certification is tougher and continued education more rigorous. Higher standards apply to administrators, too.

In fact, it seems that the only aspect of our education system that we do not hold to a higher standard are the school facilities that house that system. In 1989, "Wolves At the Schoolhouse Door," a report issued by the Education Writers Association, brought to our attention the questionable state, to put it mildly, of our nation's public school infrastructure. In 1996, film producer Jeffery Hayden leant credence to this report by taking us inside our public schools in his troubling documentary, "Children In America's Schools." In 1995, the United States General Accounting Office attached a dollar figure to the problem, estimating $112 billion in needed construction just to bring our schools up to basic health and safety standards.

And yet, "Wolves At the Schoolhouse Door" and "Children In America's Schools" have not had the same impact on public education as *A Nation At Risk*. Rather than deeming our current standards for educational facilities unacceptable and raising our expectations in the same manner that we raised them for our students, teachers, and administrators after reading *A Nation At Risk*, we continue to struggle, seemingly content just getting by. An impenetrable roof, solid walls, and an adequate mechanical system continue to be the standard even when designing new facilities. We are being presented with an opportunity to design the next generation of America's schools, and yet we have not given enough thought to how architecture could be used as an effective medium for enhancing teaching and learning.

A conversation that I recently had with a director of school facilities sums this up succinctly. He told me, "Bill, I ask of my architect just two things: that he build me a school in which the roof doesn't leak and the air conditioning works. If he can do that, that's 95% of my architectural concerns addressed."

While we might empathize with this perspective, it is no less a shame. If we a planning to invest

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$112 billion to improve our schools' infrastructure, we must ensure that that money is invested wisely and that every advantage possible is gained. Given the range of possibilities that architecture has to offer education, there is a great deal of potential waiting to be tapped. We must first, however, raise our standards and begin to expect the most from school design.

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Principles of Design

This conference is dedicated to discussion about designing the next generation of America's schools. This afternoon I would like to address five principles of design that I think are essential as we break with the past, look to the future, and establish a new standard for school facilities design.

1. Schools should be exemplary -

Children are superb observers. They are cognizant, perhaps more so even than we, of the messages that we send through design. If we design something reluctantly, halfway, or after the fact, students may get the impression that that for which we design is unimportant. Even as we attempt to teach them to incorporate, celebrate, or be sensitive to certain ideas and concepts, we may be contradicting ourselves in design. In truth, our schools should set positive examples and lead the way in pursuing new frontiers.

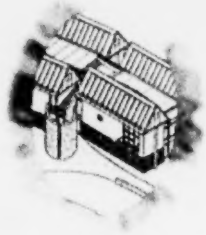
Consider technology, sustainability, and accessibility - three areas with which we struggle in design.

Regarding technology, design must follow the lead of the curriculum. The curriculum is changing to incorporate the computer as an integral part of learning. Gone are the days when classes walked down the hall to the locked room to learn about the wonders of computers. Today, computers are in every classroom and have become a vital tool for learning.

It follows then that design should embrace technology. Manassas Park High School, designed by VMDO Architects (Charlottesville, VA), does this quite effectively. Classrooms have been designed to permit the unobtrusive addition of computers and audio-visual equipment; the media center balances the celebrated notion of "the library" with requirements for information management systems; and, looking to the future, the school is completely wired for student and teacher laptops.

Regarding sustainability, it should be apparent that we cannot expect to continue to heat, cool, and light our schools in the same manner that we have in the past. It is too much of a drain on our resources - both financial and ecological. Instead we must find an alternative, economical solution - sustainable design provides that alternative.

The Frankfurt Daycare Center, designed by William McDonough Architects (Charlottesville, VA), provides a good example of such innovation. It contains a greenhouse roof that has multiple functions: it illuminates, heats both air and water, cools, ventilates, and shelters from the rain. Additionally, the roof is interactive, serving an important educational aim. The manually operated roof provides students with an opportunity to learn about the ecological systems that they are helping to preserve as they open and close the roof before and after school each day.



Regarding accessibility, our designs should be transparent. After the fact add-ons marginalize the population that relies on accessible aids. I do not have any examples of this, but that is just point. Accessible aids such as ramps, lifts, grab-bars, power assisted doors, passenger loading zones, pictograms, and text telephones, to name a few, should be as inconspicuous as the halls, windows, stairs, and doors that most of us take for granted.

We must set an example for students through our design and do more than just "accommodate," we must respect the end-users for whom we are designing.

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2. Schools should direct.

Teachers and administrators spend an inordinate amount of time directing students. "Do this. Don't do that! Enter here. Do not enter there! You may. You may not! Act this way. Do not act that way!" I do not have any statistics to verify this, but I would conjecture that teachers and administrators spend more time than they think should be necessary directing. If this is indeed the case, then I would agree.

To assist educators in their efforts, school buildings should direct. And I am *not* talking about posting more signs, erecting more barriers, adding more locks, wiring more alarms, or stringing more barbed wire. There is already entirely too much of this type of environmental noise imposed on students in schools. What I am talking about is enlisting fundamentals of architectural design to relay sensory cues to the building's users subtly, naturally, and effectively.

Behavioral architecture is a branch of psychology that studies how people respond to their surroundings. Findings reveal information about how people are naturally encouraged or discouraged from doing certain behaviors based on the information that they intuit from their environment. Health care administrators have applied this data in the design of hospitals to facilitate patient recovery and land developers and market analysts have seized upon it to control our consumer spending habits. "Orange Roofs, Golden Arches : The Architecture of American Chain Restaurants" by Philip Langdon examines the way in which the fast food industry has capitalized on research in order to control our eating impulses.

Unfortunately, schools are not known for their intuitive design. I have attended schools in which I was constantly lost or confused about my position relative to a larger context. I have visited schools where I could not find the front door or where, once inside, I could not locate the principal's office. Confusion breeds hostility and compounds the difficult task of controlling and directing kids. Behavioral architecture, when thoughtfully applied, can help alleviate this confusion. Light, space, volume, order, material, and texture contribute to a design hierarch that collectively imply a natural order and state intuitively which behaviors are appropriate and which are not.

Taft Architects applied this principle of design effectively in their design for Hope Elementary School in Hope, Indiana. A central corridor anchors a straightforward pattern of circulation. The architects used a series of arches to articulate the spine creating a syncopated rhythm that draws the occupant from one end of the building to the other. Architectural forms and additional lighting compliment the arches, accentuating cross-paths and destinations and illuminating points of interest en route. The total effect creates a thoroughfare for the school that is easily transgressed and clearly understood, even by those entering the building for the first time.

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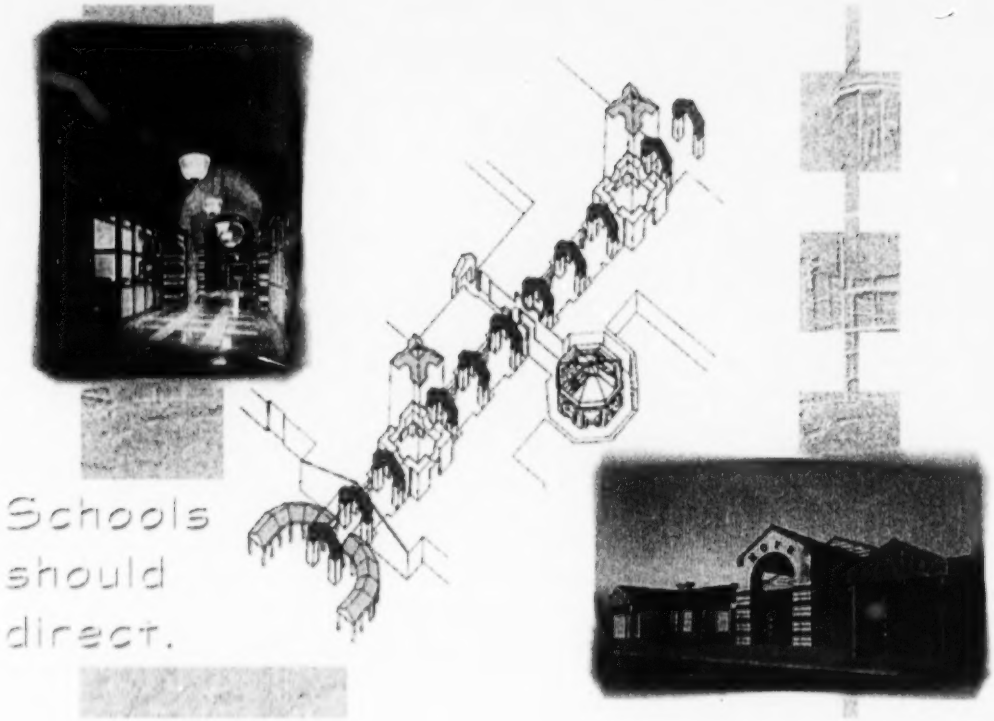

Hope Elementary School, Hope, Indiana designed by Taft Architects.

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- Pearson, C.A. (1991). Making the grade: Building Types Study 686: Schools. Architectural Review, 179, 91-105.

Expecting the Most From School Design

William S. Bradley, Ph.D.

Thomas Jefferson Center for Educational Design
University of Virginia
405 Emmet Street
Charlottesville, Virginia 22903

Phone: 804-982-2873
Fax: 804-924-0747

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3. Schools should evoke a spirit of place.

Admittedly, our schools have taken on a distinctly institutional look. Too often in our rush to expedite design we have reduced educational programs to their lowest common denominator, the results of which are lists of "defined spaces." These uniform spaces lack character and fail to provide a meaningful context for learning. Students fail to identify with their surroundings resulting in general apathy and a lost sense of community.

Architectural historian Christian Norberg Schultz described the problem this way:

In the past, human life was intimately related to things and places. ...Man had a sense of belonging and identity. The world was experienced as a world of qualities and meanings... Today we only relate to quantities... In general, the loss of things and places makes up a loss of "world." Modern man becomes "worldless" and thus loses his own identity as well as the sense of community and participation.

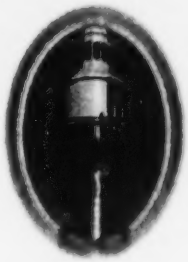
The sense of community and participation is integral to our schools and we cannot afford to lose them. Schools must be places in which the students gains a sense of identity, the educational process becomes meaningful, the educational experience becomes exciting, and the learning environment is made to seem inviting. Further, schools should reference the settings in which they are built and be places where the members of the educational community are made to feel secure and at home.

Seabird Island Elementary School, in British Columbia, Canada evokes what was referred to in ancient times as *genius loci*, or a "spirit of place." Designed by Patkau Architects (Vancouver, B.C.) for a community of Salish natives on the First Nation reservation, the school is consciously non-institutional in appearance. Its interior and exterior reference the Salish culture: traditional post and beam construction is used, portals are adorned with Salish carvings, and the exposed structure of the porch along the south facade evokes images of the racks used to dry the salmon that the Salish have traditionally harvested. Symbolically, the school is sited at the head of the community with its great roof providing shelter for the town from the severe winter winds.

The architects enlisted a participatory process to design the award winning school and construction costs for the 23,500 sq. foot facility came in at only $3.2 million.

In Curitiba, Brazil the city has begun building a series of community libraries to stimulate enthusiasm about education in the poorest neighborhoods in town. Typically children in these neighborhoods attend school through the fourth grade, at which time their parents withdraw them to begin earning income for the household. Adults in these communities are, for the most part, illiterate. It goes without saying that

education is not a top priority for these people.



At least it didn't used to be. Over the last three years, the city has built over thirty "lighthouse libraries," some attached to schools, in poor neighborhoods across the city. These colorful landmarks stand out and rise above their depressing surroundings. The working lighthouses are more than just a symbolic beacon. The two story interiors contain stacks of books and a designated project area.

This past March I visited several lighthouse libraries and I can tell you that they were teeming with activity - children and adults alike were using the library's resources with great enthusiasm. The lighthouses' "spirit of place" have created an excitement about education that was previously missing in these neighborhoods. The program has been so successful that the city is constructing ten more.

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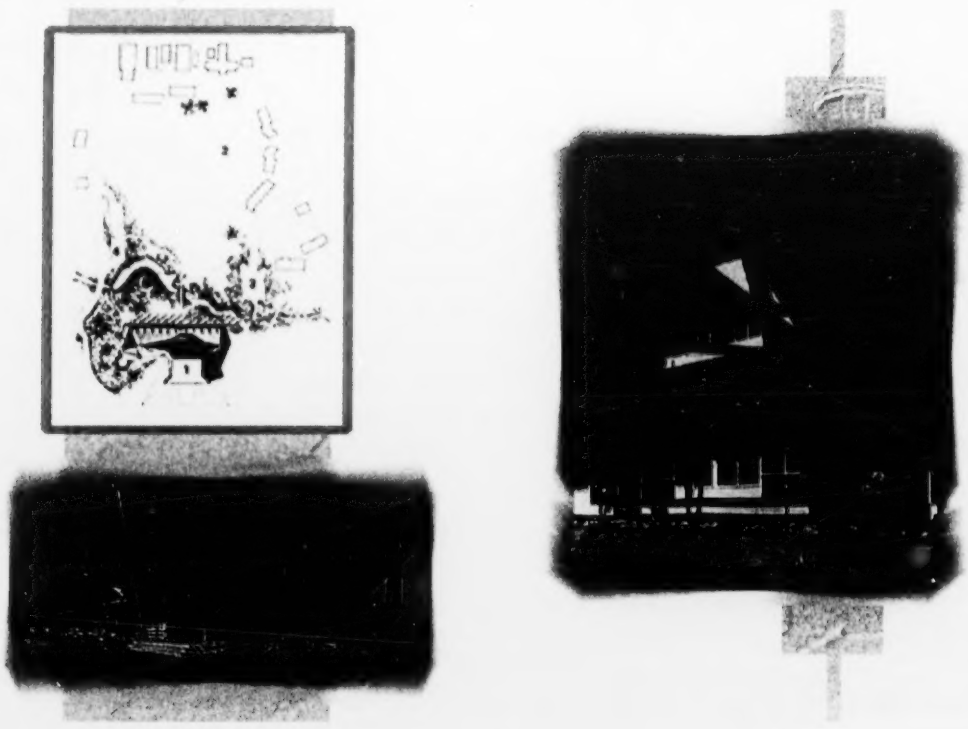

Seabird Island Elementary School in Agassiz, British Columbia designed by Paktau Architects, Vancouver, British Columbia.

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William S. Bradley, Ph.D.

Thomas Jefferson Center for Educational Design
University of Virginia
405 Emmet Street
Charlottesville, Virginia 22903

Phone: 804-982-2873
Fax: 804-924-0747

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4. Schools should teach.

The built and natural environments should be thought of as textbooks for learning and should become regular resources for teachers in planning their lessons.

There was once a time, before the advent of the printing press, that buildings, which is to say "architecture," were a primary medium for communication. A prime example of this is the medieval cathedral, a testament in stone and glass to the teachings of Christian thought. Whether symbolically in the plan and elevation or iconagraphically in the sculpture and ornamentation, the building conveyed meaning that could be interpreted by the people. In the case of the plan, window, and entabliture from the cathedral in Cologne, the lessons learned were of a religious nature. Other lessons, such as history, politics, and lore could be learned from secular buildings.

Now I'm not advocating that we carve lessons in bas relief on our schoolhouse walls - though the thought had occurred to me. What I'm suggesting is that this use of architecture seems particularly applicable to education - the built and natural environment can become three dimensional textbooks for learning. Thoughtful design incorporates rich examples of intra-curricular themes such as balance, order, symmetry, asymmetry, pattern, rhythm, form, space, volume, and scale, just to name a few.

Anne Taylor, who will address this conference tomorrow, and her research associates, George Vlastos and Alison Marshall, have taken this idea to the next level. They have studied the intersection between education and architecture and have published a curriculum that incorporates architecture as an integral part of the educational program. Their curriculum, entitled "Architecture and Children," uses the built environment as a foundation for studying the world. It deals with specific skills and content information and covers a range of subjects including, but not limited to, math, life science, health, social studies, physical education, art, music, and philosophy.

In one lesson entitled, "You Are Architecture," students learn about their bodies and how they function by drawing parallels between themselves and buildings. In another lesson entitled, "Structure In Architecture," students learn to understand the physical principles of mass, compression, and tension by creating human structures and recording how these forces effect their bodies. This past Spring I tried this lesson with students in my School Design class and it was a big success - even as graduate students they gained a new understanding of these principles and had fun.

Nancy Takahashi, a landscape architect and associate of the Jefferson Center, recently returned from

England where she studied a program being implemented in their schools called "Learning Through Landscapes." As the title suggests, this is a program that attempts to find creative ways of incorporating the resources available on school grounds into the curriculum. Locally, Nancy is involved in programs with public schools to help transform their unused courtyards into productive learning environments. Tomorrow afternoon she will host a break out session where she will look more closely at ways to tap the potential of the natural environment as a learning resource.

While the aim of using the built and natural environment as a communicative medium is not to teach children about architecture or horticulture, per se, one encouraging outcome is children's increased appreciation for and awareness of their environments. As school administrators and architects, I'm sure you can appreciate the value in this.

Incidently, as you walk back across the Lawn to the Rotunda for this evening's reception, notice the care with which Mr. Jefferson applied this design principle to his Grounds. The Pavilions and their Gardens are an excellent example of using the built and natural environment as three dimensional textbooks.

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- **Teachers' guide for "Architecture and Children" curriculum.**

Sources:

- Taylor, A. P., Vlastos, G., & Marshall, A. (1991). Architecture and children: Teachers guide. Seattle, WA: Architecture and Children Institute.
- Anne Taylor: Perspectives on Architecture and Children
- Anne Taylor, Robert A. Aldrich, and George Vlastos: Architecture Can Teach

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William S. Bradley, Ph.D.

Thomas Jefferson Center for Educational Design
University of Virginia
405 Emmet Street
Charlottesville, Virginia 22903

Phone: 804-982-2873
Fax: 804-924-0747

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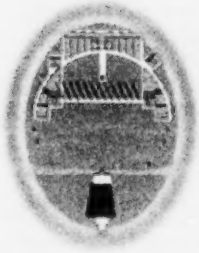
5. Schools should affect positive change in education.

People often discredit the importance of architecture in education saying things like, "Good teachers don't need classrooms, they can teach anywhere," or "Look at Socrates. He taught under a tree." True enough. Good teachers can teach anywhere and Socrates probably did teach under a tree. Given their choice, however, I would venture that good teachers, as well as Socrates, would prefer to work in enriching learning environments that compliment their teaching styles while at the same time providing inherent resources applicable to the subject areas they are teaching.

It should be obvious that we cannot execute the educational programs of tomorrow in the schoolhouses of yesteryear. Yet, comparing the floorplans and classroom configurations of schools built in the 18th century with the plans and configurations of those being built for the 21st century, it is apparent that we may be trying to do so.

What would happen if classrooms weren't square "just because"? How much better could our schools be if we taught students in learning environments that contributed to, rather than distracting from, the educational program? What would happen if we based our designs on the philosophy of the school and the curriculum being taught?



Studio designs for a rural high school sited in Nahochee Gap, Georgia challenge the traditional notion of what a school "ought" to look like by considering the curriculum taught and its underlying educational philosophy. Based on a post-formal educational philosophy, the school provides differentiated learning spaces for a variety of learning activities - some traditional, some not so traditional. The focal point of the design is a free form interior courtyard that was required as an essential component of the educational program. Spaces for public, private, and semi-private gathering give students and teachers choices about the spaces they occupy and provide a meaningful context for learning.

Educational reform cannot happen in today's school buildings. School architecture must evolve and affect positive change in education. Toward this end, educators and architects must come together to discuss educational philosophy, architectural theory, and the interaction between the two to determine ways in which 1) the built and natural environments should change in concert with the educational programs they are housing and 2) the educational programs should be modified to take better advantage of the learning environments in which they are being taught.

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Conclusion

While these five principles of design may seem self evident, it is equally evident that we are not giving them due consideration. Even well intentioned, wealthy, innovative school districts continue to build schools that are half or a quarter of what they could be. Why is this so? Why do we seem content to provide mere containers?

A recent study conducted by associates at the Thomas Jefferson Center for Educational Design reveals several possible explanations:

- First, most school construction is set in motion to address one of two problems: either over crowded or unsafe facilities. Rarely is the desire to create a new and innovative learning environment the initial catalyst for design. Consequently, school districts address the problems at hand without seizing the opportunity to design to re-think education.

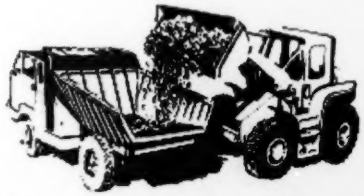
- Second, school districts that attempt to be innovative often meet with opposition. There seems to be a general perception that innovation equals more money. I once had an architect tell me that a school board rejected his designs because he submitted renderings in color that "looked" too expensive. The architect explained to the school board that the added color was just paint and that no extra cost would be incurred. The school board told him that that didn't matter, whatever the cost the population would resent the design because of the perception of expense that it created. Others simply dismiss innovation with a disgruntled, "It was good enough for me in my day, why shouldn't it be good enough for them now?"

- Third, some schools simply don't see the need to be innovative. In school districts where the students are performing above the state average, there is little incentive to tinker with success.

Finally, another possible reason why we may not be raising the standard for school design is that we may simply fail to recognize the potential contribution that the built and natural environments could make to the educational program. After hearing the speakers today and tomorrow, however, we should have a much better understanding of that potential.

I offer these explanations not as excuses, but as a challenge. As leaders in the fields of education and architecture concerned with these issues you are being given a prime opportunity to break with tradition and establish a new precedent for school design.

It almost goes without saying that we are expecting a surge in new school construction and renovation as schools built in the '50's and '60's are retrofitted and new schools are built to accommodate the echo of the baby boom. We've watched the wave coming and it is here.



In their annual report on education construction, *American School and University Journal* proclaims an end to the building recession. They report an increase of new school construction in 1996 of 31% over the same in 1995. Further, they predict that this trend will continue through 1999 and beyond.

In an independent report, the Council of Educational Facilities Planners, International confirmed these findings. They add that even with all of the new school construction that will occur, we will not be able to keep up with demand for new classrooms. Demand for renovation will peak.

As we look to the future we are faced with a tremendous opportunity to affect positive change in education through school design. As we undertake the design of the next generation of America's schools, we should expect our schools to be exemplary, to direct, to evoke a spirit of place, to teach, and to affect positive change. We should raise our standards and provide our students, teachers, and administrators the facilities they deserve. We should expect the most from our school design and except no less.

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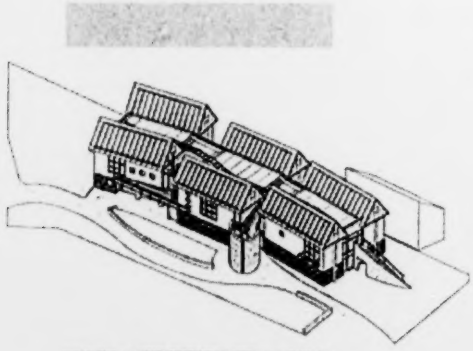

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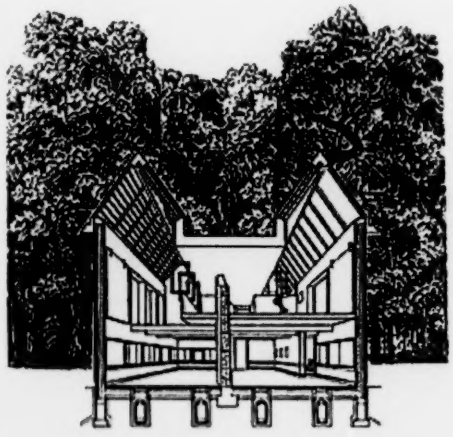

Frankfurt Daycare Center designed by William McDonough Architects, Charlottesville, VA.

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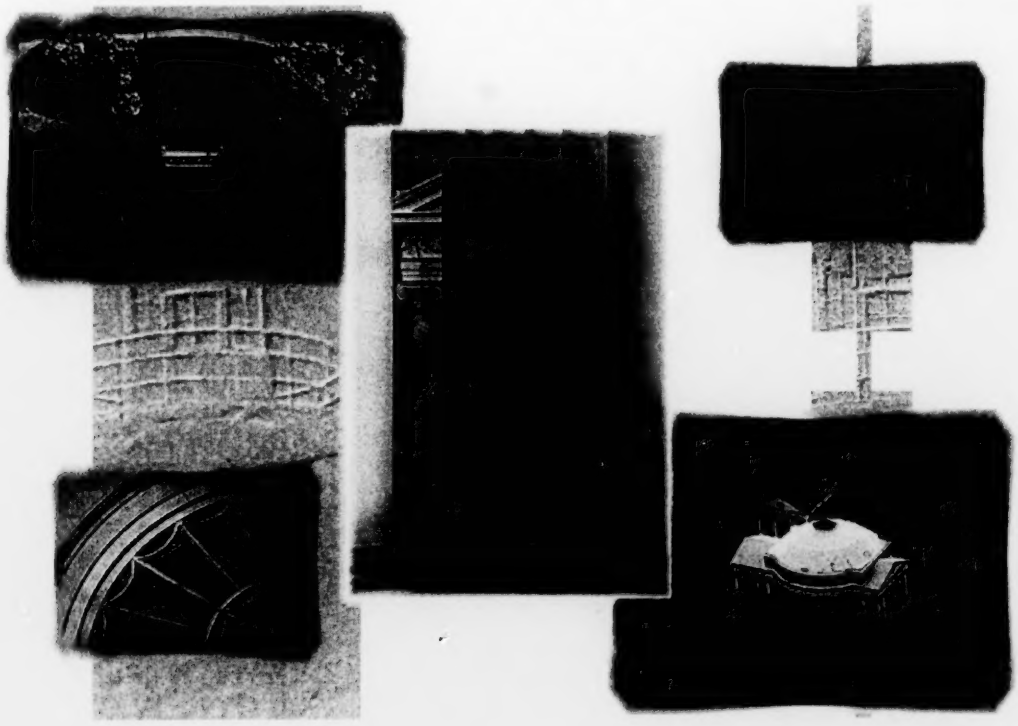
William S. Bradley, Ph.D.

Thomas Jefferson Center for Educational Design
University of Virginia
405 Emmet Street
Charlottesville, Virginia 22903

Phone: 804-982-2873
Fax: 804-924-0747



Mr. Jefferson's Lawn on Grounds at the University of Virginia.

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Charlottesville, Virginia 22903

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